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## (54) Poultry plucking apparatus

(57) The apparatus has two opposed sets of plucking fingers 1, 2 mounted in respective supports bodies 6, 7 each carried by respective supports 8, 13 so as to lie on opposite sides of a carcass path.

Each body is pivotally mounted adjacent its centre of gravity on a shaft 14. The shaft is rotatable in

bearings 15, 16 slidably located in bearing blocks 17, 18. The bearings are movable by a rack and pinion arrangement 24, 29, 30, 31 to move the body laterally towards or away from said path. The bodies are also pivotable about shaft 14 to change the angle of the plucking fingers using handle 35 and locking member 34. The bodies can also be pivoted through 180°, on removal of member 34, so that the fingers are then located outside the apparatus for easy maintenance. Quick release plucking discs and a device for inserting plucking fingers in plucking discs are also described.

FIG. 2

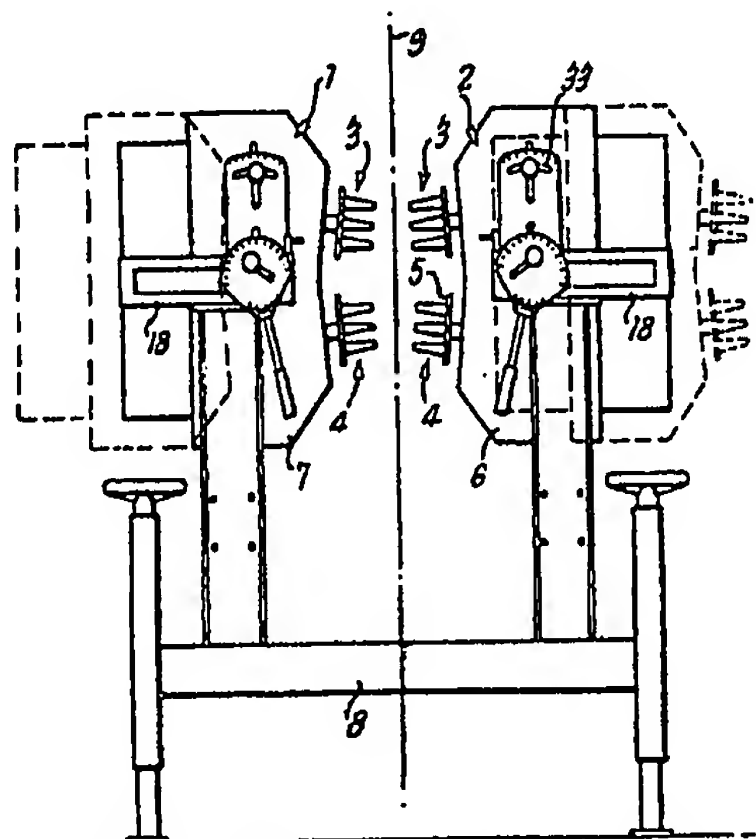
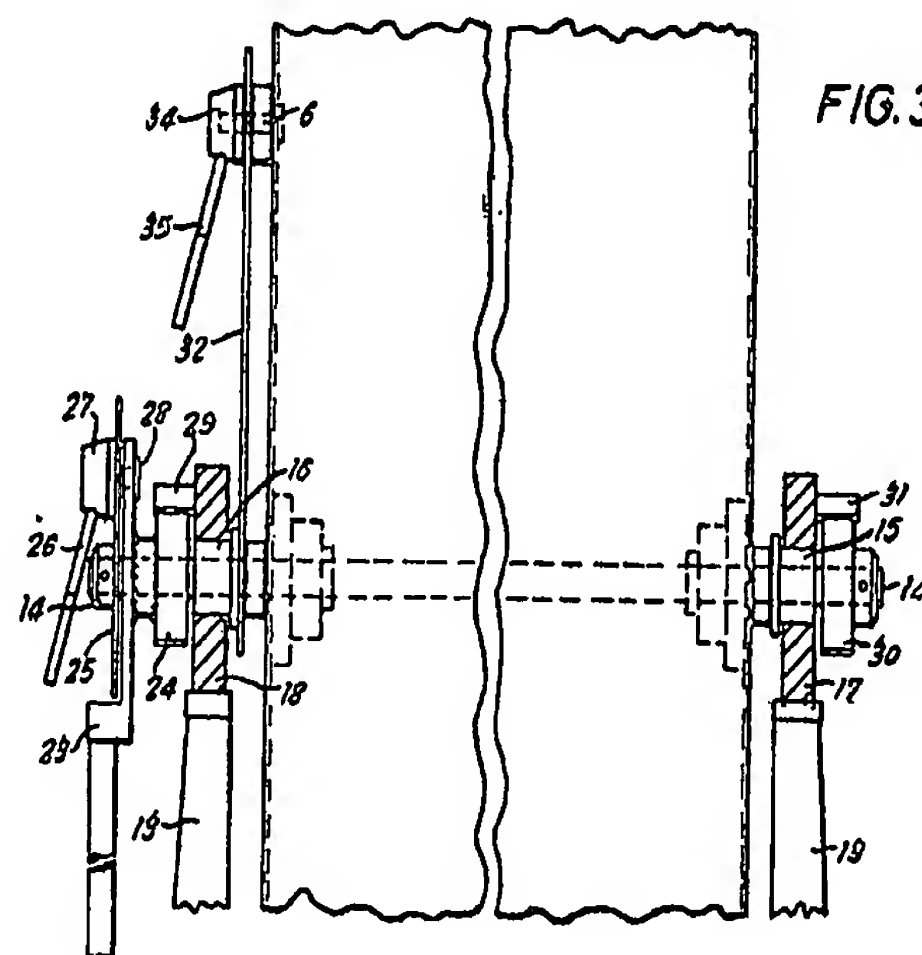
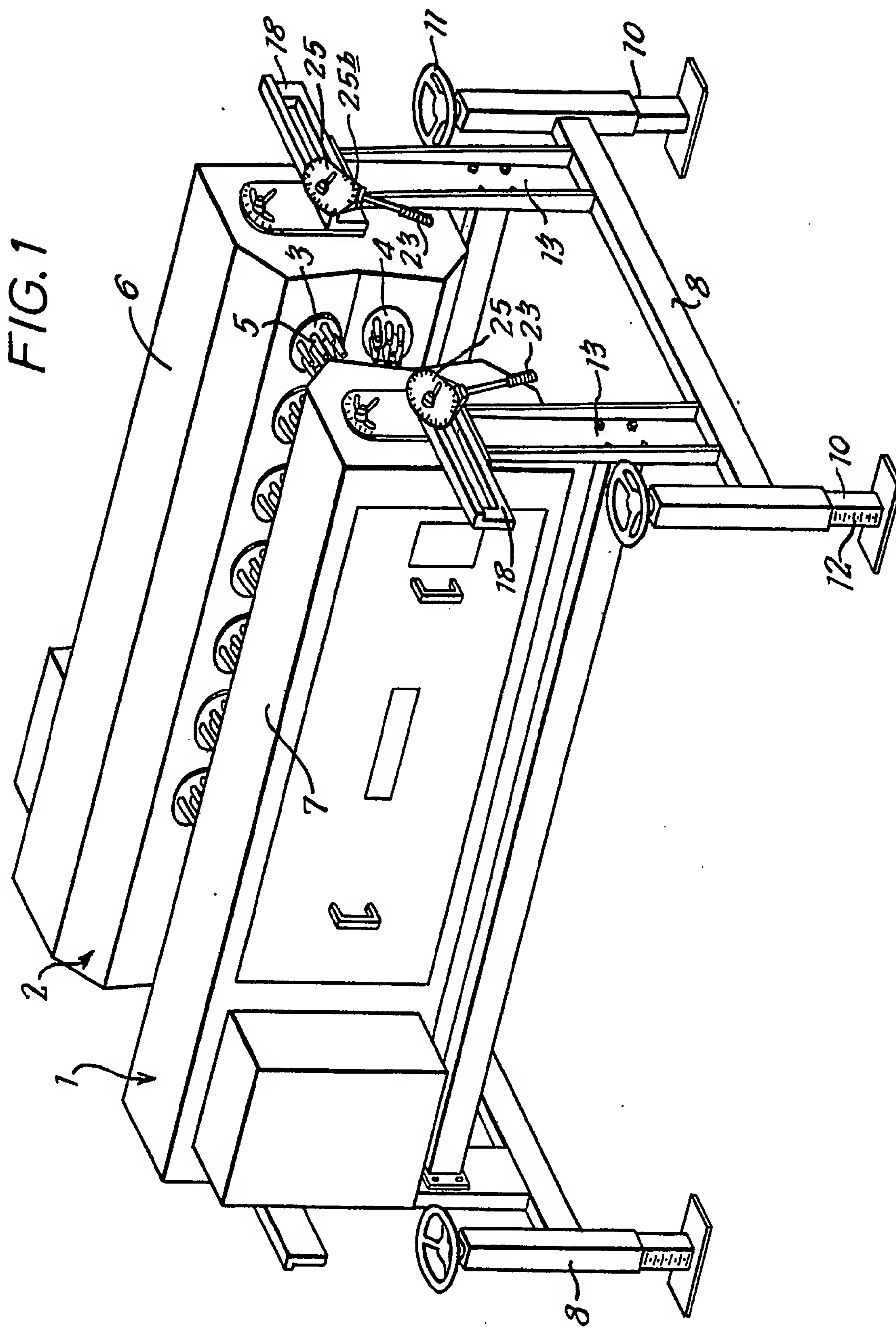


FIG. 3



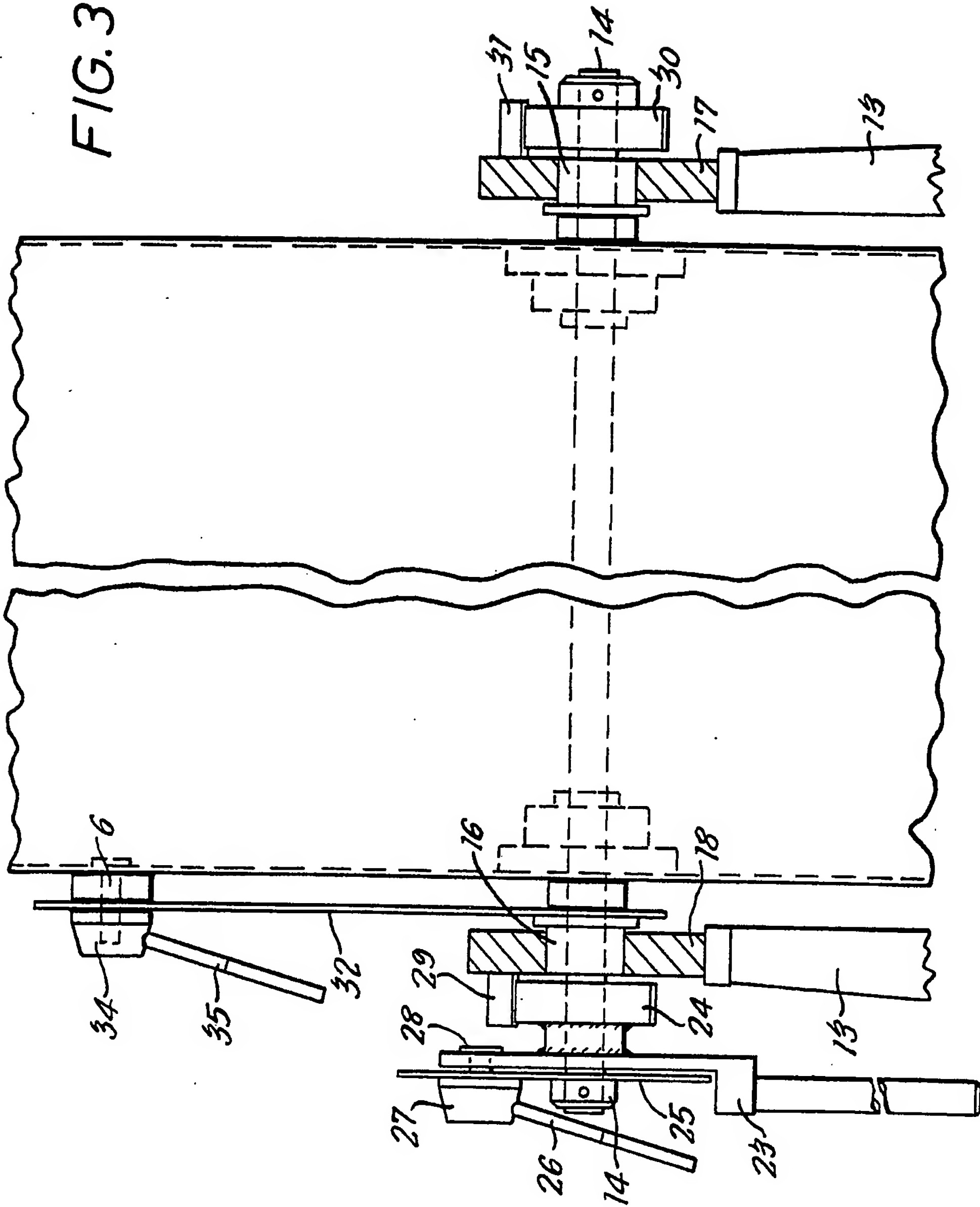
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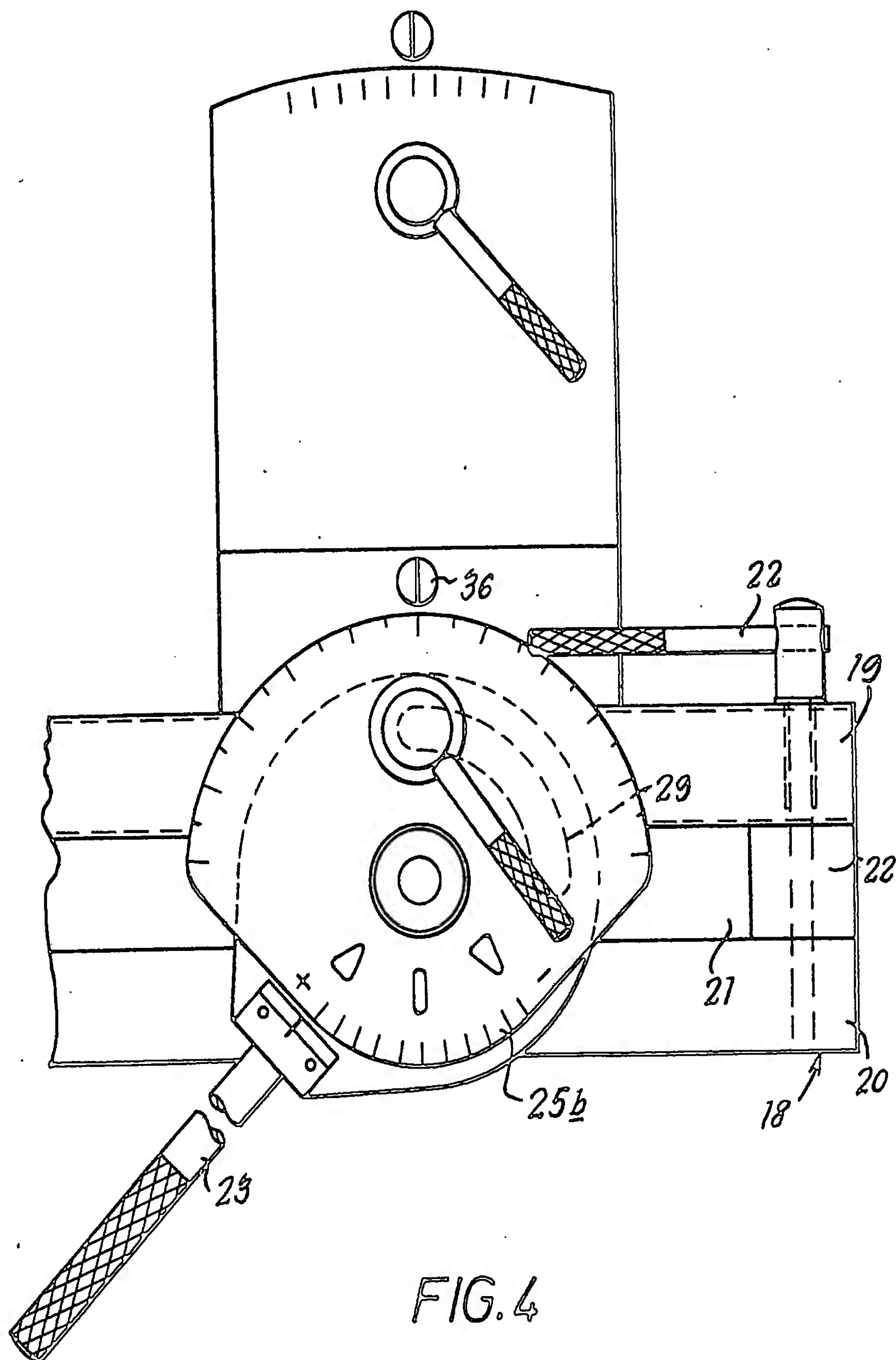


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FIG. 3



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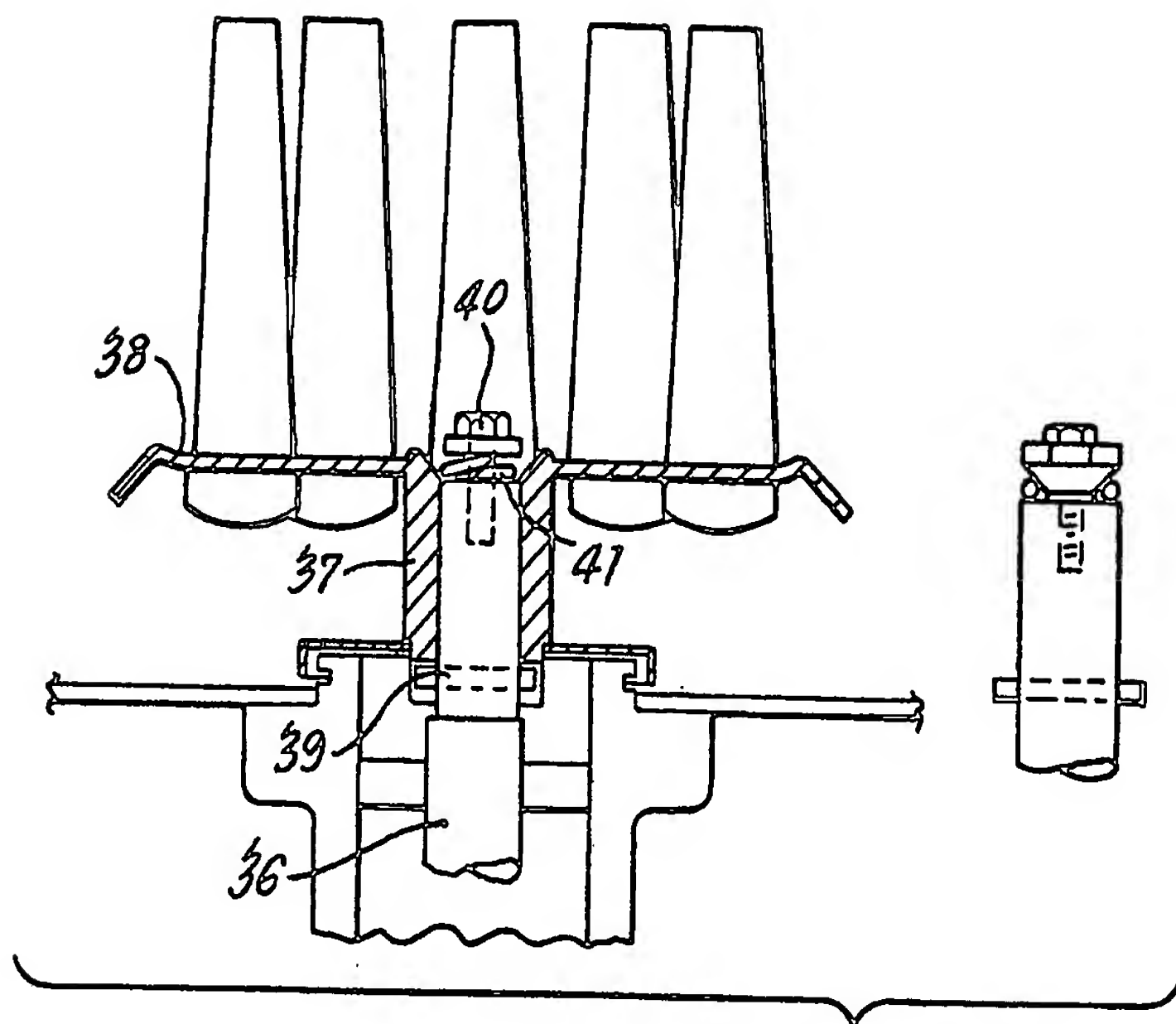


FIG. 5

FINGERS SOFT		CARD N° 1	
Type <u>BROILER</u>		Wt. <u>2½ lbs</u>	
HYDRAULIC MOTOR SPEED SETTINGS			
1	3	2	5
3	3	4	5

FIG. 8

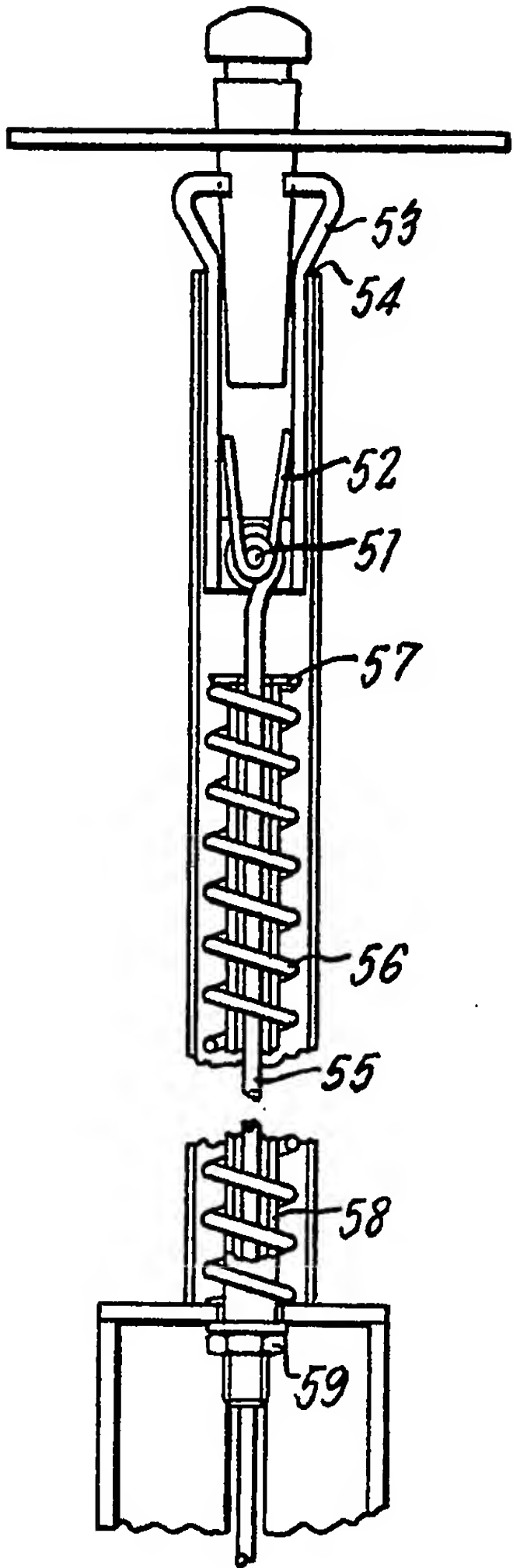


FIG. 7

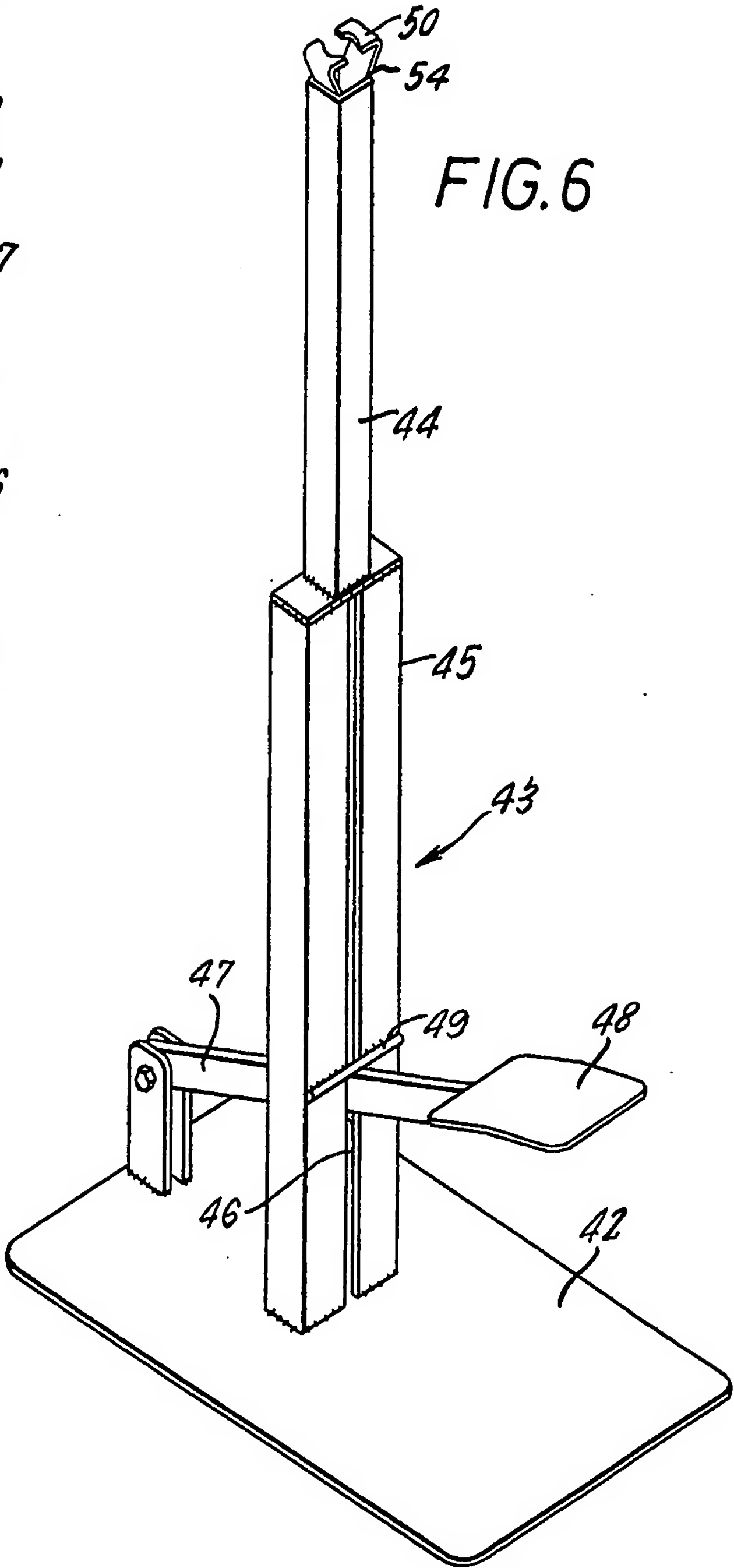


FIG. 6



## SPECIFICATION

### Poultry plucking apparatus

This invention relates to improvements in or relating to apparatus for removing or plucking  
5 feathers from poultry.

A known type of apparatus comprises two opposed sets of rotatable plucking fingers defining therebetween a path along which the poultry to be plucked is passed.

10 The positioning of the ends of the fingers relative to the poultry passing along the path is quite critical since if the fingers are too far away from the carcasses, the carcasses will not be plucked clean, whereas if the fingers are too  
15 close, the action of the fingers is too strong and damage to the carcasses results. In practice, birds vary in size and it has been necessary previously to run only identical sized birds through such apparatus. When it was required to pluck birds of  
20 different size the apparatus had to be taken out of service while fingers were adjusted to the position required for the new size of bird. This process is not only time consuming and costly in terms of lost production but requires the continual  
25 attendance of a skilled operator to carry out the adjustment as and when required.

Various ways of adjusting the spacing between the opposed sets of fingers have been proposed but the known arrangements all require the  
30 presence of a skilled operator, both to carry out the adjustment itself and to assess the effect of the adjustment of the carcasses being processed.

The present invention seeks to provide apparatus for plucking feathers from poultry in  
35 which the relative spacing between the opposed sets of fingers, and the angular adjustment of the fingers about an axis parallel to the path of the carcasses, is adjustable relative to visual data relating the desired position of the apparatus to  
40 the size of carcass being processed.

According to one aspect of the present invention there is provided apparatus for plucking feathers from poultry comprising two opposed  
45 sets of rotatable plucking fingers defining therebetween a path along which the poultry to be plucked are, in operation, passed, each set of plucking fingers being carried by a respective body pivotally mounted on support means, the  
50 centre of gravity of each body lying on or close to the pivotal axis thereof, wherein the position of each pivotal axis is selectively adaptable relative to the support means in a direction towards and away from said path to thereby vary the distance between the two opposed bodies and the sets of  
55 fingers carried thereby.

Preferably, the angular position of each body about its pivotal axis is selectively adjustable to provide a plurality of operative angular positions for the plucking fingers.

60 In a preferred embodiment, the support means for each body comprises two spaced supports on which the body is pivotally mounted in respective positionally adjustable bearings. Each bearing may be mounted on its support through an

65 elongate slide extending generally horizontally and at right angles to said path, the associated body being carried by a shaft pivotally located in a bearing block movable relative to said slide. The position of the bearing block along the slide is  
70 preferably adjustable by a screw-thread or gearing system. Preferably, the position of one of the bearing blocks relative to its slide is adjustable independently of the other block to enable one end of the body to be positioned  
75 further from said path than the other end.

According to a second aspect of the invention there is provided a plucking disc, which may be incorporated in the plucking apparatus of the present invention, the disc comprising a disc-  
80 shaped element for carrying plucking fingers and having a central boss slidable on to a drive shaft for driving engagement therewith, and securing means to secure the disc-shaped element to the shaft comprising a clamping screw threaded  
85 member adapted to be secured coaxially to the said drive shaft and a resilient ring over which said central boss is slidable and which is expandable by tightening the screw threaded device to secure  
90 the disc to the drive shaft. The screw threaded member may be of a known type of clamp bolt or may have a frusto conical surface designed to expand the ring on tightening.

The present invention also provides a device for inserting fingers in the discs. The discs each  
95 have a plurality of holes in the planar disc element in which the resilient fingers are located. The fingers have a portion of reduced diameter adjacent their root ends and are inserted in the disc by being pulled through the hole therein until  
100 the portion of reduced diameter snaps into the hole.

The present invention therefore also provides a device for inserting fingers in a plucking disc comprising an elongate tubular member open at  
105 one end, at least two jaws located in said tubular member the jaws being connected to an operating member and being adapted to be moved rear of the tubular member to enable the jaws to be urged open, the jaws having ramp  
110 means co-operable with the tubular member so that when the operating member is operated the jaws are pulled into the tubular member to be thereby automatically moved to the closed position to grip a finger therebetween and to draw  
115 the finger into the tubular member.

Although intended particularly for the insertion of fingers in plucking discs, this device is also used as a vice for holding work pieces, particularly  
120 work pieces which need to be held quickly and easily for a short operation to be carried out thereon such as de-burring machined parts.

Preferred embodiments of the present invention will now be described by way of example with reference to the accompanying drawings in  
125 which:—

Figure 1 shows a perspective view of a plucking machine incorporating the present invention,

Figure 2 shows an end view of the plucking machine illustrated in Figure 1,

Figure 3 shows in schematic form a cross-sectional view along the lines A—A of Figure 2,

5 Figure 4 shows, in enlarged form, part of the adjusting mechanism,

Figure 5 shows a cross sectional view through a plucking disc,

10 Figure 6 shows a perspective view of a work holder or plucking finger puller,

Figure 7 shows a cross sectional view through part of the device shown in Figure 6, and

Figure 8 shows a chart illustrating the setting required for a particular size and type of bird.

15 Referring now to Figures 1 and 2, in particular, there is shown an apparatus for removing or plucking the feathers from poultry carcasses. The apparatus has two opposed sets of plucking fingers 1 and 2, each set comprising two rows 3 and 4 of rotatable discs 5 which each have a plurality of plucking fingers projecting therefrom substantially coaxial to the axis of rotation of the disc. Each row 3, 4 includes seven discs, and each set 1, 2 includes two rows. Each set of discs is 20 mounted on a respective support body 6 and 7 which are carried by two spaced supports 8 in such a way as to lie on opposed side of a centre line 9 on which lies the path along which the carcasses to be processed pass through the apparatus. Each of the support means 8 has a pair of legs 10 which include a screw threaded jacking arrangement rotatable by respective wheels 11 to enable the height of each leg of the supports 8 to be individually adjusted. A height adjustment 25 scale 12 is provided on each leg. Each of the supports 8 carries a pair of generally upstanding support columns 13 on which respective ends of the two support bodies 5 and 7 are pivotally mounted in a manner to be described hereinafter.

40 Each of the support bodies 6 and 7 is, as shown particularly in Figure 3, freely mounted on bearings on a shaft 14 in such a way that the centre of gravity of the body lies on or very close to the axis of rotation of the body. The shaft 14 is rotatably mounted in bearing blocks 15 and 16 45 which are slidably located in slide blocks 17 and 18 respectively secured to respective columns 13. The slide blocks 17 and 18 each have an elongate slot therein which lies normal to the path of movement of carcasses through the apparatus in a substantially horizontal plane so that 50 movement of the bearing blocks 15 and 16 along the slots causes the two bodies 5 and 7 to be moved towards and away from one another.

55 As shown particularly in Figure 4, each slide block consists of upper and lower members 19 and 20 which are spaced apart, to define the slot 21, by a spacer block 22, the assembly being held together by a screw threaded locking bar 22. In operation, the locking bar 22 is loosened to enable adjustment of the bearing block to take place and is then tightened to rigidly clamp the bearing block in the selected position.

At the front of the apparatus, an assembly 65 consisting of an adjusting handle 23 and a gear

wheel 24 rigidly secured to the handle 23 are freely rotatably mounted on the shaft 14. An indexing plate 25 which carries a locking handle 26 is secured to the end of the shaft 14 for rotation therewith. The locking handle 26 is connected to a screw threaded locking device 27 70 which includes a locking stud 28 which passes through an arcuate slot 28a in the adjusting handle 23. If the locking handle 26 is tightened, the adjusting handle 23 and gear wheel 24 are locked to the indexing plate 25 and locking handle 26 for rotation with the shaft. The gear wheel 24 is meshed with a rack 29 secured to the slide block 18 and extending parallel to the elongate therein. In another embodiment, the rack 29 is biased resiliently into engagement with the gear wheel 24 to reduce free play or back lash.

80 At the other end of the shaft 14, at the rear of the apparatus a further gear wheel 30 is secured fast to the shaft 14 for rotation therewith, the gear wheel 30 being correspondingly meshed with an associated rack 31 secured to the slide block 17 at the rear of the machine. Again, this rack 31 may be resiliently biased into 90 engagement with the gear wheel 30.

At the front of the machine, a body tilt indexing plate 32 is secured to the bearing block 16 for movement therewith along the slots 21. At its upper end, as shown particularly in Figure 2, the indexing plate 32 has an arcuate slot 33 through 95 which a locking member 34 secured to the body 6 passes. The locking member 34 is rotatable by means of a handle 35 to selectively lock the body to the adjustment plate and thus, the angular tilt of the body 6 and hence the set of plucking fingers can be adjusted relative to the path of the carcasses. As shown in Figure 2, the arcuate slots 33 have a scale so that the angle of tilt can be set to predetermined values. If the locking member 100 34 is removed, the whole body can easily be pivoted through 180° to the position shown in outline in Figure 2 so that the discs are then positioned on the outside of the machine to enable servicing such as replacement of fingers, to be carried out easily and conveniently.

105 To adjust the relative spacing between the opposing sets of fingers, the locking device 27 is tightened, the adjusting handles 23 are pivoted and the gear wheel 24 associated therewith rotates, but since it is engaged with the rack 29, it moves along the rack, thereby moving the bearing block 16 and hence the shaft 14 and body 6 along the slot 21. A corresponding action takes place at the rear of the machine where the fixed gear wheel 30 moves along the rack 31. When the selected position, indicated by the index on the indexing plate 25 is reached, as shown by a pointer 36 in Figure 4, the locking bar 22 is tightened fully down to clamp the sliding block 16 and hence the shaft 14 in position relative to the supports 13. 125

130 If the locking device constituted by the locking handle 26 and 27 is released, to enable the handle 23 and gear 24 to rotate relative to the shaft 14, rotation of the handle 23 and hence

gear wheel 24 causes the gear wheel to move along the rack 29 as described previously, but since this is not connected for rotation to the shaft 14, the gear wheel 30 at the rear of the apparatus does not turn and hence only one end of the shaft is moved. In this way, the body 6 is positioned at an inclined angle relative to the path of the carcasses through the machine. The value of the taper is shown on a scale 25b on the indexing plate 25. Once a predetermined degree of taper has been selected and the locking device 27 is tightened, the whole body 6 can subsequently be moved towards or away from the opposed body in the member described previously, whilst maintaining the taper.

Since the setting of the present apparatus is particularly easy it is envisaged that it can be used, unsupervised, by relatively less skilled labour than the previously known machines. To assist such operators, it is envisaged that programme cards will be provided showing the settings for particular types of birds. An illustration of such a card is shown in Figure 8. As can be seen from Figure 8, the card shows representations of the indices for both sides of the apparatus and also includes a plan view of the apparatus, the arrow A showing the direction of travel on the carcasses. Each size or type of bird to be processed will have its own card, the example shown being for a broiler weighing  $2\frac{1}{2}$  pounds. The top representations show the angle of tilt and lateral position to be set on the various indices and plan view of the apparatus shows the height setting to be set for the four legs. The operator merely has to set the apparatus to the given letter or number.

Referring now to Figure 5, there is shown a sectional scrap view of one of the rotatable discs 5 which are themselves novel. The discs in operation, are fast to a drive shaft 36 which is driven by an electric or hydraulic motor (not shown). The disc comprises a central boss 37 to which is secured a disc-like plate 39 on which the fingers are mounted. The central boss 37 is a sliding fit on the drive shaft 36 and the drive from the shaft to the boss, and hence the fingers, is obtained via a drive pin 38 secured in the shaft 36 which locates in a slot in the central boss 37. The disc is secured to the shaft by means of a clamping bolt 40 and an expansible spring device 41 over which the central boss 37 can pass when the spring device 41 is unexpanded. The clamping bolt 40 is threadingly engaged coaxially in the end of the drive shaft 36 and when tightened down expands the spring device 41, which is shown in the form of a split spring washer. The expansion of the washer 41 causes the washer to either expand into positive engagement with the central boss 37 or, in an alternative design, to expand to a larger diameter than the internal diameter of the central boss 37 to thereby overlie the disc to prevent it being withdrawn from the shaft 36. Many methods and types of expanded spring ring can be utilised for this purpose. The scrap view in Figure 5 shows an alternative in which a split

spring ring of toroidal construction is provided which when the clamping bolt is tightened is expanded by a frusto-conical surface on the clamping bolt 40 or on a separate insert located between the head of the clamping bolt 40 and the spring ring. This invention has the advantage that the disc can be released from the shaft very easily, only a half or one turn of the clamping bolt being necessary before the spring ring has contracted enough to release the disc, which can then be pulled off the shaft 36.

Referring now to Figures 6 and 7, there is shown a device, which although it can be used as a general work holder is particularly useful for inserting the plucking fingers in the discs. As described previously, each disc has a plurality of holes in which plucking fingers are inserted. As shown particularly in Figure 7 each finger comprises a cylindrical, slightly tapered member having at its base, the larger end, a recessed portion of smaller diameter which is designed to fit firmly in a hole in the disc. The fingers are inserted in the disc by being pulled therethrough, from their narrow end, the fingers being sufficiently resilient to deform to enable the finger to be pulled through the disc until the portion of reduced diameter engages in the hole in the disc.

During operation of the plucking apparatus, fingers frequently break or wear out and must be replaced. In the past, this has been done manually by using a type of plier, but this has proved awkward and time consuming. The device of Figure 6 is designed to enable the fingers to be inserted quickly and easily.

The device has a base 42 from which a column 43 extends upwardly. At its upper end, the column has a square tubular member 44 which is welded to a lower support 45 having a slot 46 extending therethrough. An operating lever 47 pivotally mounted on the base 42 extends through the slot and has an operating pedal 48. A stop 49 limits the upward movement of the pedal 48.

A pair of jaws 50 are located in the top of the tubular member 44. Each of the jaws is pivotally mounted to a pivot 51 and biased outwardly by a torsion spring 52. On their outer faces, each jaw has a ramp 53 which is co-operable with the associated top edge 54 of the tubular member 44 so that when the jaws are drawn into the tube the ramps cause the jaws to be closed. The jaws 50 are connected through the pivot 51 to a rod 55 which extends downwardly through the column to be connected to the operating lever 47. A concentric coil spring 56 surrounds the rod 55, the spring acting between the upper surface of the support member 42 and a spring stop 57 secured to the member 45 through a tube 58. Screw threaded adjusting means 59 are provided to adjust the length of the tube and hence the spring 56. This adjustment determines the "at rest" position of the device.

In operation, the weight of the jaws and the lever 47 and pedal 48 ensures that the lower edge of the jaws abuts the spring stop 57 and the



height of this spring stop relative to the column 44 is adjusted to ensure that in this rest position of the apparatus the jaws lie substantially flush with the top edge 54 of the tubular member 44.

- 5 This serves to prevent an operator's fingers inadvertently being caught in the jaws.

- To insert the plucking fingers in a disc, the fingers are manually inserted partially into the disc as shown in the scrap view included in Figure 6. The operator then lifts the pedal 48 by placing his foot underneath it, this action causing the jaws to be lifted clear of the tubular member 44 to the position shown in Figure 6 and 7, which enables the operator to insert a plucking finger in the jaws. The operator then presses the pedal 48 down, which pulls the jaws into the tubular member 44 and the ramps 45 acting against the upper edge 54 causes the jaws to be closed thus gripping the finger securely. The disc itself abuts against the top edge 54 of the tubular member 44 while the finger is drawn into the tube by the jaws until it is located correctly in the disc. Once the jaws have reached the position where they are flush with the top edge of the member 44 continued downward movement of the pedal 48 compresses the spring 56.

- When the operator sees that the finger is fully inserted he releases the pedal 48 which is returned to the rest position by the spring 56, where the jaws lie flush with the top of the tubular member 44. The operator then lifts the pedal with his foot to release the finger. It has been found practical for all of the fingers in one disc to be inserted partially by hand and then sequentially fully inserted in the disc by using the machine.

- The apparatus is also particularly useful for use as a general work holder. Where small components need to be held for a short operation, such as deburring, to be carried out, the component can be quickly and easily gripped in the jaws, the necessary work carried out and the component quickly released and replaced by a fresh work piece.

- In a further development the device may be constituted as a portable machine, the operating pedal and base, being replaced by an air or hydraulic piston and cylinder device the jaws being connected to the piston and the tubular member 44 being connected to the cylinder.

#### Claims

1. Apparatus for plucking feathers from poultry comprising two opposed sets of rotatable plucking fingers defining therebetween a path along which the poultry to be plucked are, in operation, passed, each set of plucking fingers being carried by a respective body pivotally mounted on support means, the centre of gravity of each body lying on or close to the pivotal axis thereof, wherein the position of each pivotal axis is selectively adjustable relative to the support means in a direction towards and away from said path to thereby vary the distance between the

two opposed bodies and the sets of fingers carried thereby.

2. Apparatus as claimed in claim 1 wherein the angular position of each body about its pivotal axis is selectively adjustable to provide a plurality of operative angular positions for the plucking fingers.

3. Apparatus as claimed in claim 1 or 2 wherein the support means for each body comprises two spaced supports on which the body is pivotally mounted in positionally adjustable bearings.

4. Apparatus as claimed in claim 3 wherein each bearing is mounted on its support through an elongate slide extending generally horizontally and at right angles to said path, the associated body being carried by a shaft pivotally located in a bearing block movable relative to said slide.

5. Apparatus as claimed in claim 4 wherein the position of the bearing block along the slide is adjustable by a screw threaded or gearing system.

6. Apparatus as claimed in claim 4 or 5 wherein the position of one of the bearing blocks of each support means relative to its slide is adjustable independently of the other block to enable one end of the body to be positioned further from said path than the other end.

7. Apparatus as claimed in claim 4, 5 or 6 wherein said shaft is a one-piece shaft extending between the two supports.

8. Apparatus as claimed in claim 5, 6 or 7 wherein each support includes a rack engageable by an associated pinion mounted on the shaft.

9. Apparatus as claimed in claim 8 wherein one of said pinions is selectively securable to the shaft for rotation therewith, the other pinion being fast to said shaft, the arrangement being such that when said one of the pinions is secured to the shaft for rotation therewith, rotation of the pinion and shaft causes the associated body to be moved towards or away from said path with a constant alignment relative thereto, and when said one pinion is not secured to the shaft, rotation of the pinion causes only the end carrying said one pinion to move relative to said path.

10. Apparatus as claimed in claim 9 including a first control for rotating the shaft and having means to indicate the positioning of the body relative to said path, and a second control for selectively securing said one pinion to the shaft and means for indicating the angular displacement of the shaft with respect to said path.

11. Apparatus as claimed in any one of the preceding claims wherein the bodies are pivotable through at least 180° relative to the support means to enable the plucking fingers to be checked from outside the machine.

12. Apparatus for plucking feathers from poultry substantially as described herein with reference to, and as illustrated in, Figures 1 to 4 and 8 of the accompanying drawings.

13. A plucking disc for the apparatus as claimed in any one of claims 1 to 12 comprising a

- disc-shaped element for carrying plucking fingers and having a central boss slidable on to a drive shaft for driving engagement therewith, and securing means to secure the disc-shaped element to the shaft comprising a clamping screw-threaded member adapted to be secured coaxially to the said drive shaft and a resilient ring over which said central boss is slidable and which is expandable by tightening the screw-threaded device to secure the disc-shaped element to the drive shaft.
14. A plucking disc as claimed in claim 13 wherein the screw-threaded member has a generally frusto-conical surface designed to expand the ring on tightening.
15. A device for inserting fingers in a plucking disc having a disc-shaped element with a plurality of holes into which plucking fingers are insertable, the device comprising an elongate tubular member open at one end, at least two jaws located in said tubular member, the jaws being connected to an operating member and being adapted to be moved clear of the tubular member to enable the jaws to be urged open, the jaws
- 25 having ramp means cooperable with the tubular member so that when the operating member is operated, the jaws are pulled into the tubular member to be thereby moved automatically to the closed position to grip a finger therebetween and to draw the finger into the tubular member.
- 30 16. A device as claimed in claim 15 wherein the jaws are biased to the open position by resilient means.
- 35 17. A device as claimed in claim 15 or 16 wherein said operating member is manually operable.
- 40 18. A device as claimed in claim 17 wherein said operating member is operable by means of a pneumatic or hydraulic ram-and-cylinder device.
- 45 19. A device for inserting fingers in a plucking disc substantially as described herein with reference to and as illustrated in Figures 6 and 7 of the accompanying drawings.
20. A plucking disc for poultry plucking apparatus, substantially as described herein with reference to, and as illustrated in Figure 5 of the accompanying drawings.